Summary

In January 2006, Georgia Technology Authority (GTA) posted RFI for a GTA RFI 980-260039. The purpose of the RFI was to solicit vendor participation in a Voice over Internet Protocol Trial.

The vendors were expected to participate with selected agency customers to provide, at no cost to GTA or the agency, temporary Voice over Internet Protocol (VoIP) service that would be deployed through multiple sites in selected agency offices. The duration of this trial program was anticipated to be for a period of 180 days.

Purpose

The overall purpose of the VoIP Trial Program was to determine the value of VoIP for State Governmental Agencies and other customers, as well as the following:

1. Test features and functionality.
2. Test interoperability
3. Test the agency LAN readiness
4. Test WAN readiness (technical and financial) for VOIP implementation at an enterprise level.
5. Test the usability of VOIP specific features
6. Test the customer satisfaction
7. Document Lessons Learned

Participants

The VoIP trial included participation from the following agencies and vendors:

1. Georgia Forestry Commission and Cisco
2. Department of Human Resources and Avaya
3. Georgia Bureau of Investigation and Stormwood
4. Department of Technical and Adult Education and Mitel

Lessons Learned

Based on agency and vendor input, information was collected in three areas.

- **What went well on the project**: these focused on the things that went better than expected or that were not as difficult or troublesome as planned.
- **Areas for improvement**: these focused on things that went worse than expected or that did not go as well as planned
- **Overall Impressions**: these were key takeaways, both positive and negative

To provide "lessons learned" to other projects or VoIP implementations, all areas have been re-characterized as actions to take and then categorized toward an audience of interest.

Leadership and Agencies

These lessons apply to the state leadership and agencies considering VoIP solutions.

- Change

  Despite the best efforts to ease migration and support existing processes, new technology will be different and will require agency changes. Some features will just NOT be reproducible under the new solution. **When implementing VoIP solutions, the state leadership should set an expectation for change.**

- Viability and Quality

  Every trial found the vendor solution viable and more than acceptable for business use. Once implementation issues were resolved there were no ongoing issues with the service quality, and in most cases the participants rated the service as excellent. **VoIP is viable for the state to use for its critical voice needs.**

  Note: because of the duration of the trials and extended time to plan and resolve implementation issues, any long-term or chronic issues were not detected or have not been experienced.

- Cost Savings

  Because the vendors participated at no cost to the state, there is no clear evidence of what the cost to value of the services might be. Any deployment of VOIP should be looked at over a complete multi-year Total Cost of Ownership analysis (cabling, LAN electronics, WAN, Security, PSTN, administrative & technical personnel, training, handsets, and loss of productivity during change out.) Requests which only include VOIP equipment costs should be re-visited. **State leadership should expect agencies to conduct a multi-year total cost of ownership prior to implementing VOIP.**

- Benefits

  The most apparent benefits were for those state workers whose functions require greater mobility or remote access to state systems. While other uses were seen as potentially beneficial, there was no measurable increase in user efficiency during the trial, which may be attributable to the duration and financial arrangements of the trial. **State leaders should look to deploy VoIP first to those workers who have mobility requirements, greenfield deployments or a unique business driver.**

Because of the short nature of the trial, the benefits related to increased efficiency and flexibility or to managing "moves, adds and changes" was not measurable. The expectation is that these efficiencies exist and would benefit the state.

- State Readiness

  The trials encountered areas that required upgrades to network facilities, even when the participating state agency could cherry-pick the portion of their organization that participated. **Agencies will need to plan for additional costs to upgrade facilities when taking on a VoIP implementation.**

- Time Frames

  The trial participants had several examples where they required additional planning time beyond what was expected. **Agencies need to budget appropriately for planning.**

Specification and Procurement

These lessons apply to the technical specification and procurement of VoIP solutions.

- Consulting Services

  The participating vendors seemed heavily invested in the success of the state's trial. The participating agencies were highly appreciative of how the vendor was essential to the success of their trial. While this lauds the various vendors' commitment, it also cautions that implementation and consulting services will be required for success. **The state should plan on engaging vendor services for implementation and support** (Note: this is included in the current VOIP RFP.)

- Solutions that Interoperate

  New systems carry a heavy burden in training and integration. Solutions that integrate and extend the state's existing systems reduce this burden and protect the state's previous investment in technical solutions and human processes. **Where functionality and benefits are comparable, the state should prefer solutions that leverage and extend its existing technology.**

  The current strategy of choosing a hybrid-PBX solution for VoIP has this idea at its core – that migrating the state to VoIP will be more effective if the state can continue to use its current telephony solutions as it increases its use of VoIP. The findings of the trials seem to reinforce this for many other applications where VoIP can be applied; such as: dial-plan, email, messaging, mobility, wireless, web, presence, identity, IM, video, etc.

  The solutions with the best value will be those that do not replace the state's current technologies, but show that how they make the state's current technologies better.

- Vendor Management

  At some point, each of the trials had to work with multiple vendors. Those situations always incurred delay to that trial. Sometimes the vendors engaged in finger pointing or were even openly hostile. Some of the strongest lessons from the trial surround vendor management.

  The state should only engage one vendor for a solution. However in telecommunications, this is hardly possible; therefore, **the state should try to engage a master vendor who will hold ultimate responsibility for success.** (Note: this is included in the current VOIP RFP.)

- Platforms

  The solutions or the portions of a trial's solution, that were deployed as appliances seemed easier to deploy and easier to manage than those that required more traditional n-tier architecture components (servers, operating systems, databases). **Where functionality and benefits are comparable, the state should prefer solutions that are presented as appliances.**

Design and Planning

These lessons apply to the architecture of VoIP solutions as a state agency plans to deploy them into their organization.

- Time for Planning

  Each trial engaged in a period of deployment design and planning which identified the current architecture and designated the solution deployment architecture. Good planning and architecture seems to have been essential to the success of the trials.

  The agencies were mostly surprised by the amount of time required, and in several cases the planning took more time than was allocated. **Additional planning time needs to be allocated for projects with more complexity; especially where there are requirements for: integration, support for legacy systems, multiple sites, and multiple vendors.**

- Identify Network Facilities Requirements

  All the trials bore some requirements for the participating agencies to increase their network facilities. These facilities were things like: increase bandwidth, add PRI trunks, upgrade switches, add network addresses, change-out cabling, or additional HVAC/Power. **When planning a VoIP solution deployment, the state should anticipate other facility requirements.**

  In particular, Network Addressing and Network Address Translation seemed to pose issues to the trials. Worse, these issues could not simply be solved by purchasing the right hardware or circuit, but needed to be addressed through careful network planning and architecture. **When planning a VoIP deployment, the state should carefully examine the organization's architecture for potential issues in network addressing.** The state may need to identify capabilities for session border control as part of, or along side of, any VoIP solution.

- Testing

  As part of the trial, each vendor was expected to make an assessment of the participating agency's network. While time consuming, the trials seem to validate a clear benefit to doing a pre-implementation network assessment. **When planning a VoIP deployment for an organization, the state should conduct an end to end assessment of each site's network capability to support VoIP.**

  Beyond benchmarking the network capability, the trials also seem to identify benefit in the ability to provide end-to-end testing of the network (VoIP device to VoIP service) to provide consistent benchmarks and quicker problem determination. The Burton Group's recommendations for VoIP also emphasize proactive testing and management capabilities. **The state may need to identify capabilities for end-to-end VoIP testing as part of, or along side of, any VoIP solution.**

- Security

  Security should be addressed in the planning process, and current security policies should be followed in architecting the deployment. **If necessary, security policies should be extended or updated to be applicable to the new VoIP solution.**

- Network Independence

  All the trial solutions had options for network independence and survivability, and only varied in the complexity and cost of the network elements required to achieve the desired level of survivability. Clearly voice service is critical to the continued operation of these agencies. **As part of the deployment design, the state should establish some level of network independence and survivability for each organization.**

- Legacy Support

  Some of the trials required the vendor solution to integrate with their agency's existing technologies. This certainly shows more benefit to the agency but interoperability issues were encountered. Even with those issues, the state should seek to leverage its existing legacy technologies wherever possible.

  Some legacy systems may need to be upgraded in order to integrate with any new VoIP solution. Some legacy systems can not be upgraded and will require yet a third system to bridge the functionality from the new VoIP solution into an existing solution. **When planning to deploy VoIP as integrated to a legacy solution, the state will need to verify in detail what the existing system can support and in some cases budget to upgrade that system or purchase an additional point-solution to make the integration possible.**

- Bandwidth and QoS

  The trials deployed VoIP solutions into a variety of environments: high bandwidth, low bandwidth, QoS and non-QoS. The trials found that the most critical resource for quality was network bandwidth; more so than Quality of Service. QoS will NOT compensate for inadequate bandwidth, but additional bandwidth may compensate for the lack of QoS. **Based on financial modeling and cost/benefit analysis, the state should compare the costs of additional bandwidth versus QoS.**

  Quality of Service is most useful when merging network data of different priorities (best-effort traffic merging with real-time traffic) where the low priority traffic may burst to levels that use all available bandwidth.

- MPLS

  The trial vendors were complimentary of the state's choice to run VoIP on an MPLS capable network; however, there were some specific problem areas.

  Outside of bandwidth and QoS issues, the choice of carrier transport for MPLS seemed to effect how well the network performs with real-time traffic. DSL and multi-link Frame-Relay carriers had performance issues. **When deploying significant VoIP traffic (more than one or two simultaneous calls), the state should prefer to use private-line (T1-based) carriers.**

  The trials also show more issues in areas being supported by Independent phone carriers. **The state should do additional testing when deploying VoIP into ILEC areas.**

- Innovation

  A couple of the trials found that the vendor's VoIP solution could benefit the agency in an unexpected manner; often providing more benefits than the focus of the trial to that point. VoIP is a young technology with a wide range of applications, some as yet undiscovered. **During deployment planning, the state should look for ways that VoIP can provide innovative improvements and seize those opportunities.**

Implementations

These lessons apply to implementers of VoIP solutions.

- Change (repeat from Leadership section)

  Despite best efforts to ease migration and provide integration, new technology will be different and will require agency changes. Some features will just NOT be reproducible under the new system. **When implementing VoIP solutions, the leadership should set an expectation for change.**

- Upgrade Network Facilities

  During the trials, each agency had some requirements to increase or change their network facilities. The VoIP trials that did not accomplishing these upgrades before implementation encountered delays and implementation issues. **Where possible, the state should strive to upgrade the network facilities before implementing the VoIP solution.**

- Project Management

  The trials seemed to validate several tenants of good communication and project management. Where communication was maintained across all groups, the projects went well. Where communication was dropped, projects were delayed. Where change was coordinated across all groups, the projects went well. Where change was not coordinated, projects encountered issues. **The state should maintain strong project management when implementing VoIP solutions.**

  During implementation each trial ran into some essential component that was missing, step that was overlooked, skill that was unavailable, or equipment that was delayed. VoIP is a new technology at the state and implementations will encounter over sights in planning. To ensure success, **when implementing a VoIP solution the state should establish clear goals and identify the most essential features up-front (prioritize the implementation). Implementations should also look to leverage knowledge gained in earlier deployments to minimize risk and issues in later deployments.**

  The trials seemed to show that VoIP technology touches many more areas of an organization than traditional telecommunications. Added areas mean additional places where change needs to be coordinated. **Implementers of VoIP within a state organization should expect to include more people (personnel from their traditional IT, data and voice), than with other telecommunications projects.**

- Testing

  As part of the trial, each vendor was expected to make an assessment of the participating agency's network. While time consuming, the trials seem to validate a clear benefit to doing a pre-implementation network assessment. These network assessments seemed to give a benchmark for what the organization could expect from the VoIP solution. **Implementers of VoIP within a state organization should test network facilities before implementation.**

  Although the short duration of trials did not show any benefit to extended testing, the expectation is that network facilities and the VoIP solution should also be tested for a period of time after implementation.

Appendix – Source Feedback

The following tables have the source feedback from the agencies participating in the trial. References and information that would immediately identify a vendor or agency has been removed. Some feedback that could not be cleared of identifying vendor or agency identifiers has been removed, but was still taken into account for analyzing the lessons learned.

WHAT WENT WELL ON THE PROJECT (Focus on the things that went better than expected or that were not as difficult/troublesome as planned):
• Appliance based solutions are easier to manage and deploy
• An architecture for network independence, where remote sites do not require connections to the central solution, is critical to agencies continuity of operation.
• Architectures supporting network independence also enables a more ad hoc deployment strategy, where there is never a “critical” this site must be first/last.
• Extending existing tools and applications, such as using Outlook to handle contacts, can greatly ease the adoption and training burden.
• Even when using a hard phone or analog phone, soft-phone features and/or phone management applets can greatly enhance access to phone features and overall satisfaction with the phone service.
• The capability to integrate and extend existing phone systems is critical to agency adoption.
• VoIP systems can supply consistent and excellent voice quality

AREAS FOR IMPROVEMENT (Focus on the things that were worse than expected or that did not go as well as planned.):
• Legacy systems may need upgrades in order to integrate with the new system
• Integration with some legacy systems may be problematic
• Legacy vendors/carriers may be hostile to integrating with the new system
• Multiple vendor involvement may cause additional delays and finger pointing
• New circuits may be required
• Essential equipment may be overlooked or delayed
• Network Addressing and Network Address Translation may bring complications and delays
• Essential steps or components may be overlooked in planning
• Planning may take longer than anticipated or estimated
• Gaining leadership sponsorship may take longer than anticipated
• Cost savings (in toll charges or trunking) will not drive implementation
• VoIP systems may not be able to replicate some features from PBX systems
• On MPLS, use T1 carriers instead of DSL or Frame-Relay carriers
• Independent LEC areas may not have VoIP ready circuits

OVERALL IMPRESSIONS (key takeaways, both positive and negative that you would share with other projects of a similar nature or with the same client):
• Set an expectation for change – the new system will be different
• Make security part of the architecture and implementation planning
• Maintain existing security practices
• Practice good project management
• Maintain good channels of communication
• Coordinate change across all groups
• Engage in good planning and architecture
• Establish the goals and most essential features up-front (and prioritize the implementation)
• Test network facilities ahead of implementation
• Bandwidth is critical (more than Quality of Service)
• QoS is most important when merging best-effort data traffic with real-time traffic where bursts of BE may impact the available bandwidth
• The flexibility, availability and simplicity of the management interface is essential for enabling self service to regional and agency administrators for moves-adds-changes.
• Minimize the number of vendors engaged, or at least attempt to maintain a master vendor
• Coordinate dial tone and wide area network connectivity with installation of hardware.
• Enable end-to-end testing of the network
• Test the systems for a period of time past the implementation date
• Upgrade switches/networks/facilities BEFORE implementing VoIP
• Leverage existing systems
• The opportunities and benefits for SIP trunking seem worth pursuing